

# Chapter 3

## Autism Spectrum Disorder and In Vitro Fertilization

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### ABSTRACT

*During the last decades, Assisted Reproductive Technology (ART) was performed under infertility reasons and gave hope to couples for reproduction. Along with the increase in the use of ART, there was also an increase in the diagnosis of children with Autism Spectrum Disorder (ASD). The consequences of in Vitro Fertilization (IVF) in children were investigated by many studies, including premature birth, low birth weight and developmental disorders, similar factors presented in ASD. Due to similarities between these factors, a correlation was considered possible. The purpose of this review was to investigate the possible correlation between ASD and IVF. The majority of the studies did not present statistically significant correlation between those two factors, following retrospective data. In some studies, correlations between*

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*Intracytoplasmic Sperm Injection and ASD, and Hormonal Treatment during ART and ASD, were noted. Further research should be implemented in order to identify the main cause of ASD, and giving more information about the contributing factors.*

## **INTRODUCTION**

The development of In Vitro Fertilization (IVF) helped many infertile couples into making a family. Despite the controversies, IVF provided opportunities and techniques that could control reproduction (Gardner, 2015). During the last decades, IVF has been used with an increasing rate and set the foundation for the reproduction course (Franklin S. 2013, Wright et al. 2006, Nyboe et al. 2007, Sunderam S. et al. 2013, Sandin S. et al. 2013). In particular, issues of male infertility, such as non-active sperm, or female infertility, such as tubal obstruction, can be effectively treated with IVF (Ben-Nagi J. et al. 2009, Hart RJ. 2015, Siristatidis C. et al. 2015, Tanbo T. et al. 2017). In addition, it changed the modern family, where even deceased partners can produce offspring, or same-sex partners can have children, giving a different meaning to the terms “father” and “mother” (Wright et al. 2006).

Although the results of IVF are largely successful, it has been linked to different developmental disorders, such as Attention Deficit Hyperactivity Disorder, Autism Spectrum Disorder, or motor and auditory deficiencies (Mains L. et al 2010, Shimada T et al. 2012, Al-Hathlol K et al. 2020, Koniares KG et al. 2020). More specific, Autism Spectrum Disorder (ASD) is an important neurodevelopmental disorder with social, behavioral and lingual deficits, which affects approximately 1 out 100 children (First MB, 2015, Kotsopoulos S. 2015, Francis K. 2005, Theoharides TC et al. 2008). It was first described by psychiatrist Kanner Leo, where he examined children presenting stereotypical behavior, lack of social interest and repeating certain words or phrases (Kanner L. 1971). The identification of a cause of ASD was deemed as difficult, due to multiple factors that contribute, such as genetic, environmental, biological, or even psychological (Ben-Nagi J. et al. 2009, Landrigan PJ. 2010).

However, correlation between ASD and IVF is expected, due to similarity of risk factors, such as increased parental age, high educational level of mothers and the occurrence of hormonal disorders (Ingudomnukul E et al. 2007, Geier DA, Geier MR. 2006, Lung FW et al. 2009, uyeung B, Baron-Cohen S, Ashwin E, et al. 2009). Studies on children using Assisted Reproductive Technology (ART) have shown that they were more likely to have perinatal outcomes, such as prematurity or low birth weight, compared to children not using ART (Wright VC et al 2003, Schieve LA et al 2004, Wen J et al 2012, Silberstein T et al. 2014, Declercq E et al. 2015, Luke B, et al. 2016, Jenabi E e al. 2020). Moreover, in a 2016 study, infants

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